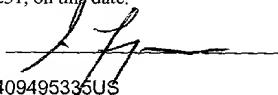


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1 Inventors: James Hickey; Zamaneh Mowzooni.

2 METHOD AND SYSTEM FOR LOGGING EVENT DATA

3 The present invention generally relates to a method and system
4 for logging event data from at least one operable application program or at least
5 one peripheral device operably connected to a server. More particularly, it
6 relates to a method and system for logging event data that retrieves all the event
7 data for the server, and can maintain a persistent connection when the event
8 data are being downloaded to allow the server to attend to multiple requests
9 resulting in the downloading of event data as they come in.

10 A computer server commonly uses a vast array of application
11 programs and peripheral devices. Each of the application programs and the
12 peripheral devices generally generates event data for events that occur during
13 the operation of the computer server. Events are significant occurrences of a
14 task or program and may relate to matters such as completions, connections,
15 processes, terminations, status changes, errors and warnings. The event data

1 are essential for network diagnostic and troubleshooting. The event data are
2 often used by other application programs and peripheral devices as well.

3 Because of all the different connections and communications
4 between computers that are easily available today, computer troubleshooting is
5 no longer limited to the site of the computer. As a result, there is a need to
6 keep a log of these event data over an extended period of time that can be
7 easily downloaded by users of other computers. However, a typical transfer of
8 a file involves a single request and a single response methodology. In other
9 words, when a file is requested, the two connecting computers will generally
10 terminate their connection once the transfer of the file is complete, which is
11 especially true for a connection over the Internet. Since these event data
12 change rapidly, it would be very useful to be able to keep a persistent
13 connection for downloading the event data file. A persistent connection allows
14 for multiple requests to be served by the server while at the same time
15 permitting the requesting computer to continue downloading the event data as
16 the server continues its operation and new event data comes in.

17 One prior method is to buffer the event data on the server, with
18 periodic requests being made to download the event data. In this method, all
19 the event data are stored on the server's memory, which remain until a request
20 to download is made. Depending on the capacity of the server and the
21 frequency of the downloading, one problem is that some of the event data may
22 have to be discarded. As a result, valuable event data may be lost using this
23 method. Furthermore, that implementation requires servers with significant
24 resources in order to handle busier networks, which may be impracticable for
25 the use of an appliance with an embedded smaller scale server, such as a
26 Hewlett-Packard JetDirect product.

1 Another prior method that establishes a persistent connection
2 through the web is uses Java applets, which establish their own TCP/IP
3 connection to the server and continuously receive the event data. However, a
4 problem with this method is its inflexibility, because it limits the connections to
5 computers that support Java applets. As a result, it is limited to the use of a
6 web connection, and cannot be used with an intranet connection or a direct
7 cable connection. Furthermore, a security certificate is required for a Java
8 applet to establish a network connection, which may not be practical depending
9 on the implementation.

10 Accordingly, a primary object of the present invention is to
11 provide an improved method and system for logging event data that provides a
12 persistent connection for downloading event data.

13 Still another object of the present invention is to provide an
14 improved method and system for logging event data that maintains a log of
15 event data ready for downloading.

16 Yet another object of the present invention is to provide an
17 improved method and system for logging event data that is more flexible and
18 less restrictive.

19 A further object of the present invention is to provide an
20 improved method and system for logging event data that can maintain a
21 persistent connection for downloading while allowing the server to attend to
22 multiple requests and continue logging the event data.

23 SUMMARY OF THE INVENTION

24 The present invention generally relates to a method and system
25 for logging event data from at least one operable application program or at least
26 one peripheral device operably connected to a server. More particularly, it

1 relates to a method and system for logging event data that keeps all the event
2 data for the server and maintains a persistent connection when the event data
3 are being downloaded while allowing the server to attend to multiple requests.

4 In accordance with the present invention, there is provided a
5 method and system for logging event data from at least one operable
6 application program or at least one peripheral device operably connected to a
7 server using a log manager device driver. The method includes the steps of
8 registering the log manager device driver with the server to receive all
9 incoming event data, registering the log manager device driver with the server
10 as a log manager file, the log manager device driver receiving the event data,
11 and the log manager device driver responding to a download request for the log
12 manager file from a requesting computer.

13 Other objects, features and advantages will become apparent
14 upon reading the following detailed description, in conjunction with the
15 attached drawings, in which:

16 FIGURE 1 is a schematic exemplary diagram of a network
17 architecture in which the present method can be implemented;

18 FIG. 2 is a flowchart illustrating a subroutine of the log manager
19 device driver initializing and receiving the event data;

20 FIG. 3 is a flowchart illustrating a subroutine of the log manager
21 responding to a download request for the event data; and,

22 FIG. 4 is a flowchart illustrating a part of the subroutine shown in
23 FIG. 3.

24 **DETAILED DESCRIPTION**

25 Broadly stated, the present invention is directed to an improved
26 method and system for logging event data in a server that receives all event
27 data ready for downloading to another computer using a persistent connection.

1 A log manager device driver first registers with the server to receive all
2 incoming event data and as the device driver for a log manager file. After the
3 registration with the server, the log manager device driver starts receiving the
4 event data and responding to a download request for the log manager file from
5 a requesting computer.

6 Turning now to FIG. 1, a schematic diagram of an exemplary
7 network architecture is shown, which illustrates one way that the network can
8 be connected for the implementation of the present invention. As shown in
9 FIG. 1, a server 10 is installed with at least one application program 12 (three
10 shown) and connected at least one peripheral device 14 (three shown). A log
11 manager device driver 16 is preferably placed in the server along with the
12 application program 12.

13 In the present invention, a requesting computer 18 seeking to
14 download event data from the server 10 would make a request to download a
15 log manager file 20, which is represented as a regular file and not a device
16 driver file. Since the log manager device driver 16 had registered itself as the
17 log manager file 20 at the startup, the log manager device driver would, in
18 reality, be opened by the requesting computer 18. In practice, the server 10 and
19 requesting computer 18 treat the connection as a download of a very large file.
20 However, the log manager file 20 does not really exist. Rather the request of
21 the file prompts the log manager device driver to return event data to the
22 server, which is sent to the requesting computer as data of the log manager file.

23 As shown in FIG. 1, an event queue 22 is preferably implemented
24 with the log manager device driver 16 for storing event data that has not yet
25 been downloaded. However, the permanent storage of the event data is not
26 necessary. For example, the present invention can be implemented to display
27 the data as it is downloaded from the temporary memory of the server 10. In

1 addition, the connection arrangements can be altered. As an example, a
2 peripheral device 14 need not be connected to the server 10, and the same is
3 true for the application program 12. These other arrangements and
4 implementations are within the scope of the present invention.

5 Turning now to FIG. 2, a flowchart showing the steps of the log
6 manager device driver 16 initializing and receiving event data from the
7 application program 12 or the peripheral device 14 is shown and generally
8 indicated at 24. Device drivers comprise software that control hardware
9 components or peripheral devices, such as a magnetic disk, magnetic tape or
10 printer. At the startup of the computer, the device driver generally registers
11 with the operating system as a device driver for a particular hardware
12 component or peripheral device.

13 For the present invention, at the startup of the server (block 26),
14 the log manager device driver 16 first registers with the server to receive all
15 event data (block 28). More specifically, the operating system of the server 10
16 is instructed that any time an application program 12 or a peripheral device 14
17 requests to log an event, the event data should be sent to the log manager
18 device driver 16. Generally, the application programs and the peripheral
19 devices control when and what event data are sent, and the log manager device
20 driver 16 just simply receives the event data. Next, the log manager device
21 driver 16 registers with the server again, except this time as a device driver for
22 the log manager file 20 (block 30).

23 After all the registrations are made with the server, the log
24 manager device driver 16 then sits idle waiting for event data from the
25 application programs 12 or the peripheral devices 14 (block 32). Once an
26 application program 12 or a peripheral device 14 sends the event data to the log
27 manager device driver (block 34) and the log manager device driver 16

1 receives the event data (block 36), the log manager device driver then
2 determines whether the event queue is full for the newly arrived event data
3 (block 38). If the event queue is full (block 40), the log manager device driver
4 18 deletes the oldest event data in the queue in order to make room (block 42)
5 to save the newly arrived event data in the event queue (block 44). After
6 saving the event data in the queue (block 44, the process loops back to the log
7 manager device driver waiting for more incoming event data (block 32). The
8 receiving event data process is done by the log manager device driver
9 regardless of whether there is a download request initiating the downloading
10 process. In other words, the log manager device driver receives and saves all
11 the event data in the event queue waiting for the requesting computer 18 to
12 download the log manager file 20 from the server 10.

13 Turning now to FIGS. 3 and 4, a flowchart of the subroutine of
14 the log manager device driver responding to a download request of the event
15 data is shown and generally indicated at 46. To initiate this process, a
16 requesting computer 18 must first request a log manager file from the server 10
17 (block 48). The requesting computer 18 then determines whether the server 10
18 received the request to ensure a valid connection between the requesting
19 computer and the server (block 50). If it is determined that the server 10 did
20 not receive the request (block 50), the requesting computer 18 will return an
21 error message (block 52), which is preferably displayed to the user (block 54).
22 On the other hand, if the server 10 did receive the request (block 50), the server
23 will open the log manager file 20 from the log manager device driver 16 (block
24 56).

25 The server next determines whether the log manager file 20 is
26 successfully opened from the log manager device driver (block 58). If the
27 opening of the file proves to be unsuccessful (block 58), the server 10 will

1 return an error message to the requesting computer 18 (block 60), which is
2 again preferably displayed to the user (block 62). If, however, the file is
3 opened successfully, the server reads the event data from the event queue
4 (block 64), and determines whether there are any event data available (block
5 66).

6 If the event queue does not have any event data available (block
7 66), the server blocks, meaning it stays idle and waits, until event data are
8 available in the event queue (block 68). Similarly, the log manager device
9 driver also stays idle and waits for the event data (block 70). When event data
10 are sent from the application program 12 or the peripheral device 14 (block 72),
11 the log manager device driver 16 receives the event data (block 74) and
12 determines whether the event queue is full (block 76). If the queue is full
13 (block 78), the oldest event data in the queue will be deleted to make available
14 space for the newly arrived event data (block 80). Once the event queue 22 has
15 the available space in the event queue (block 78), the log manager device driver
16 16 saves the event data in the queue (block 82).

17 Now that event data is available (block 66), FIG. 4 shows the
18 remaining steps the subroutine from FIG. 3. Referring now to FIG. 4, since
19 event data is available in the queue, the log manager device driver returns the
20 event data in the queue to the server (block 84). The server receives the event
21 data (block 86), and sends it to the requesting computer (block 88). The
22 requesting computer receives the event data from the server (block 90), and
23 preferably displays it to the user immediately or at some point (block 92).

24 It is next determined if the requesting computer wishes to
25 continue downloading the log manager file (block 94). Since the log manager
26 file 20 does not technically exit, in practice the log manager file is a way to
27 maintain the connection between the server 10 and the requesting computer 18.

1 As long as the requesting computer 18 thinks that the downloading of the log
2 manager file 20 is not complete, the connection remains. As a result, a
3 persistent connection is maintained between the server 10 and the requesting
4 computer 18.

5 If the requesting computer 18 wishes to continue downloading
6 the log manager file 20 (block 94), the requesting computer waits for more
7 event data from the server 10 (block 96), and loops the process when the server
8 sends more event data to the requesting computer (block 88). Because the
9 requesting computer thinks that the log manager file is a very large file and the
10 download is incomplete, the connection terminates only when the users choose
11 to end the connection, meaning the computers themselves cannot automatically
12 end the download process. If a user does choose to discontinue downloading
13 the log manager file (block 94), the requesting computer 18 will terminate the
14 connection to the server 10 (block 98). The server will then close the log
15 manager file (block 100), and disconnect from the requesting computer as well
16 (block 102).

17 From the foregoing description, it should be understood that an
18 improved method and system for logging event data has been shown and
19 described which have many desirable attributes and advantages. The method
20 and system allow logging all the event data for a server, which is ready for
21 downloading using a persistent connection. As a result, a more flexible and
22 less restrictive method and system is provided, since the server is able to attend
23 to multiple requests and continue logging the event data during the download
24 process. A user will be able to view the event data as they are created.

25 While various embodiments of the present invention have been
26 shown and described, it should be understood that other modifications,
27 substitutions and alternatives are apparent to one of ordinary skill in the art.

1 Such modifications, substitutions and alternatives can be made without
2 departing from the spirit and scope of the invention, which should be
3 determined from the appended claims.

4 Various features of the invention are set forth in the appended
5 claims.

WHAT IS CLAIMED IS:

1 1. A method for logging event data from at least one
2 operable application program or at least one peripheral device operably
3 connected to a server using a log manager device driver, said method
4 comprising the steps of:

5 registering said log manager device driver with said server to
6 receive all incoming event data;

7 registering said log manager device driver with said server as a
8 device driver for said log manager file;

9 receiving said event data by said log manager device driver; and,
10 responding to a download request for said log manager file from
11 a requesting computer by said log manager device driver.

1 2. The method according to claim 1 wherein prior to said
2 receiving step further comprising the steps of:

3 waiting for event data from said at least one application program
4 or said at least one peripheral device by said log manager device driver; and,

5 sending event data to said log manager device driver by said at
6 least one application program or said at least one peripheral device.

1 3. The method according to claim 1 wherein prior to said
2 receiving step, said method further comprising the step of saving said event
3 data in an event queue by said log manager device driver.

1 4. The method according to claim 3 wherein prior to said
2 saving step further comprising the steps of:

3 determining whether said event queue is full by said log manager
4 device driver; and,

5 deleting an oldest event data from said event queue to make
6 available space for new event data when said event queue is full by said log
7 manager device driver.

1 5. The method according to claim 1 wherein said responding
2 step, said method further comprising the step of:

3 3. sending a download request for said log manager file to said
4 server by said requesting computer;

5 5. determining whether said server received said download request
6 by said requesting computer;

7 7. returning an error message if said server did not receive said
8 download request by said requesting computer; and,

9 9. opening said log manager file from said log manager device
10 driver if said server received said download request by said server.

1 1. 6. The method according to claim 5 wherein said returning
2 step further comprising the step of displaying said error message to the user of
3 said requesting computer by said requesting computer.

1 1. 7. The method according to claim 5 wherein said opening
2 step further comprising the steps of:

3 3. determining, by said server, whether said log manager file was
4 successfully opened from said log manager device driver;

5 5. returning an error message to said requesting computer when said
6 log manager file was not successfully opened by said server; and,

7 reading said event data stored in said event queue when said log
8 manager file was successfully opened by said server.

1 8. The method according to claim 7 wherein said returning
2 an error message step further comprising the step of displaying said error
3 message to the user of said requesting computer by said requesting computer.

1 9. The method according to claim 7 wherein said reading
2 step further comprising the steps of:

3 determining whether said event data are available from said event
4 queue by said server;

5 blocking until said event data are available when said event data
6 are not available by said server;

7 returning said event data to server when said event data is
8 available by said log manager device driver.

1 10. The method according to claim 9 wherein said blocking
2 step further comprising the steps of:

3 waiting for said event data from said at least one application
4 program or said at least one peripheral device by said log manager device
5 driver;

6 sending said event data to said log manager device driver by said
7 application program or said peripheral device;

8 receiving said event data by said log manager device driver; and,
9 saving said event data in said event queue by said log manager
10 device driver.

1 11. The method according to claim 10 wherein prior to said
2 saving step, said method further comprising the steps of:

3 determining whether said event queue is full by said log manager
4 device driver; and,

5 deleting an oldest event data from said event queue to make
6 available space for a new event data when said queue is full by said log
7 manager device driver.

1 12. The method according to claim 9 wherein said returning
2 event data step further comprising the steps of:

3 receiving said event data from log manager device driver by said
4 server;

5 sending said event data to requesting computer by said server;
6 and,

7 receiving said event data from server by said requesting
8 computer.

1 13. The method according to claim 12 further comprising the
2 steps of displaying said event data to an user by said requesting computer.

1 14. The method according to claim 12 further comprising the
2 steps of:

3 determining whether said requesting computer wants to continue
4 downloading said log manager file by said server;

5 waiting for more event data from said server when said
6 requesting computer wants to continue downloading said log manager file by
7 said requesting computer; and,

8 terminating the connection to said server when said requesting
9 computer does not want to continue downloading said log manager file by said
10 requesting computer.

1 16. A system for logging event data from at least one operable
2 application program or at least one peripheral device operably connected to a
3 server using a log manager device driver, comprising:
4 means for registering with said server to receive all incoming
5 event data;
6 means for registering said with said server as a device driver for
7 said log manager file;
8 means for receiving said event data; and,
9 means for responding to a download request for said log manager
10 file from a requesting computer.

1 17. A log manager device driver for logging event data from
2 at least one operable application program or at least one peripheral device
3 operably connected to a server, comprising:
4 means for registering with said server to receive all incoming
5 event data;

6 means for registering with said server as a device driver for said
7 log manager file;
8 means for receiving event data; and,
9 means for responding to a download request for said log manager
10 file from a requesting computer.

1

ABSTRACT OF THE DISCLOSURE

2

METHOD AND SYSTEM FOR LOGGING EVENT DATA

3 A method and system for logging event data from at least one
4 operable application program or at least one peripheral device operably
5 connected to a server using a log manager device driver. The method includes
6 the steps of registering the log manager device driver with the server to receive
7 all the event data from the server, registering the log manager device driver
8 with the server as a log manager file, the log manager device driver receiving
9 the event data, and the log manager device driver responding to a download
10 request for said log manager file from a requesting computer.

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FIG. 1

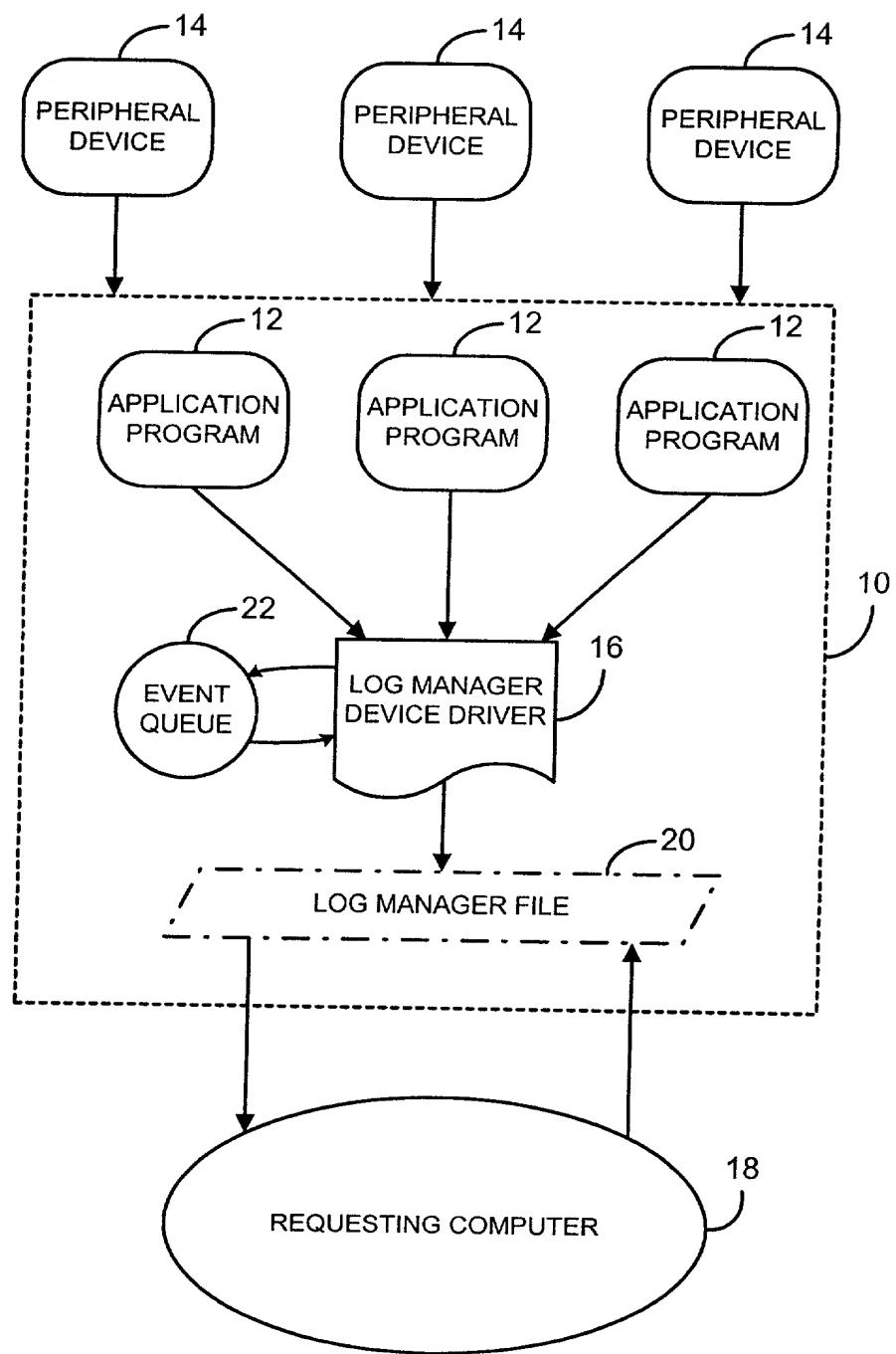


FIG. 2

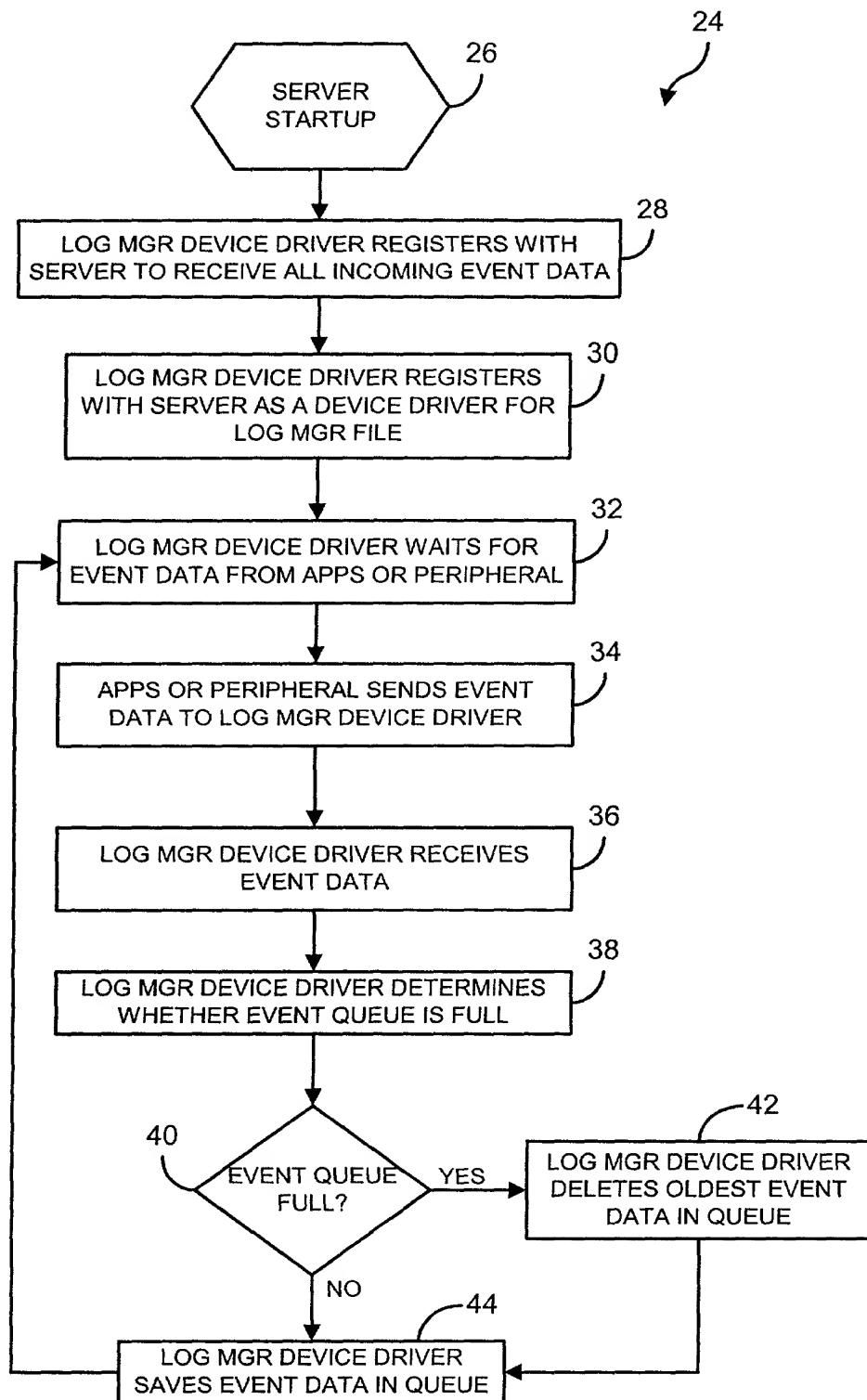


FIG. 3

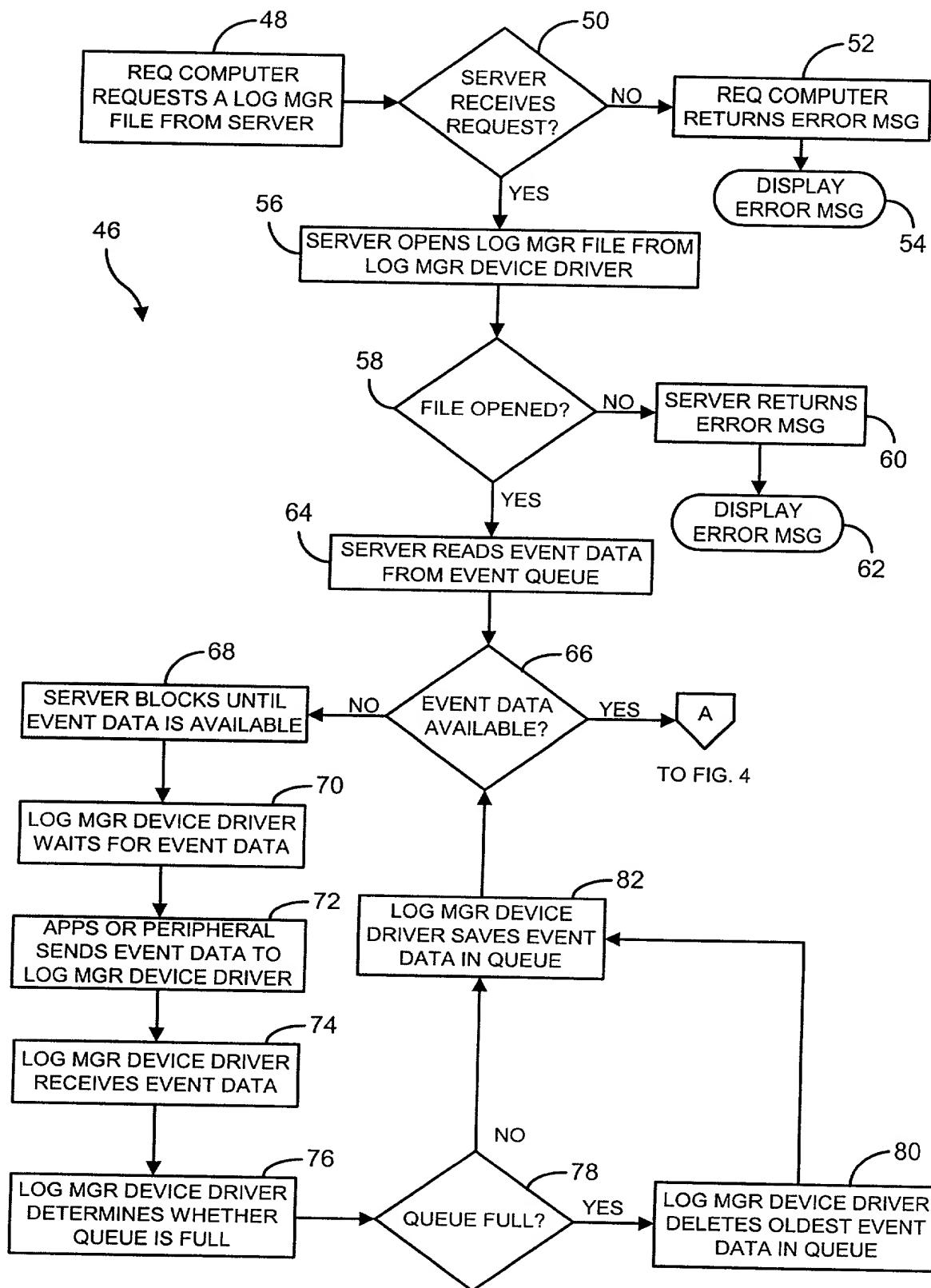
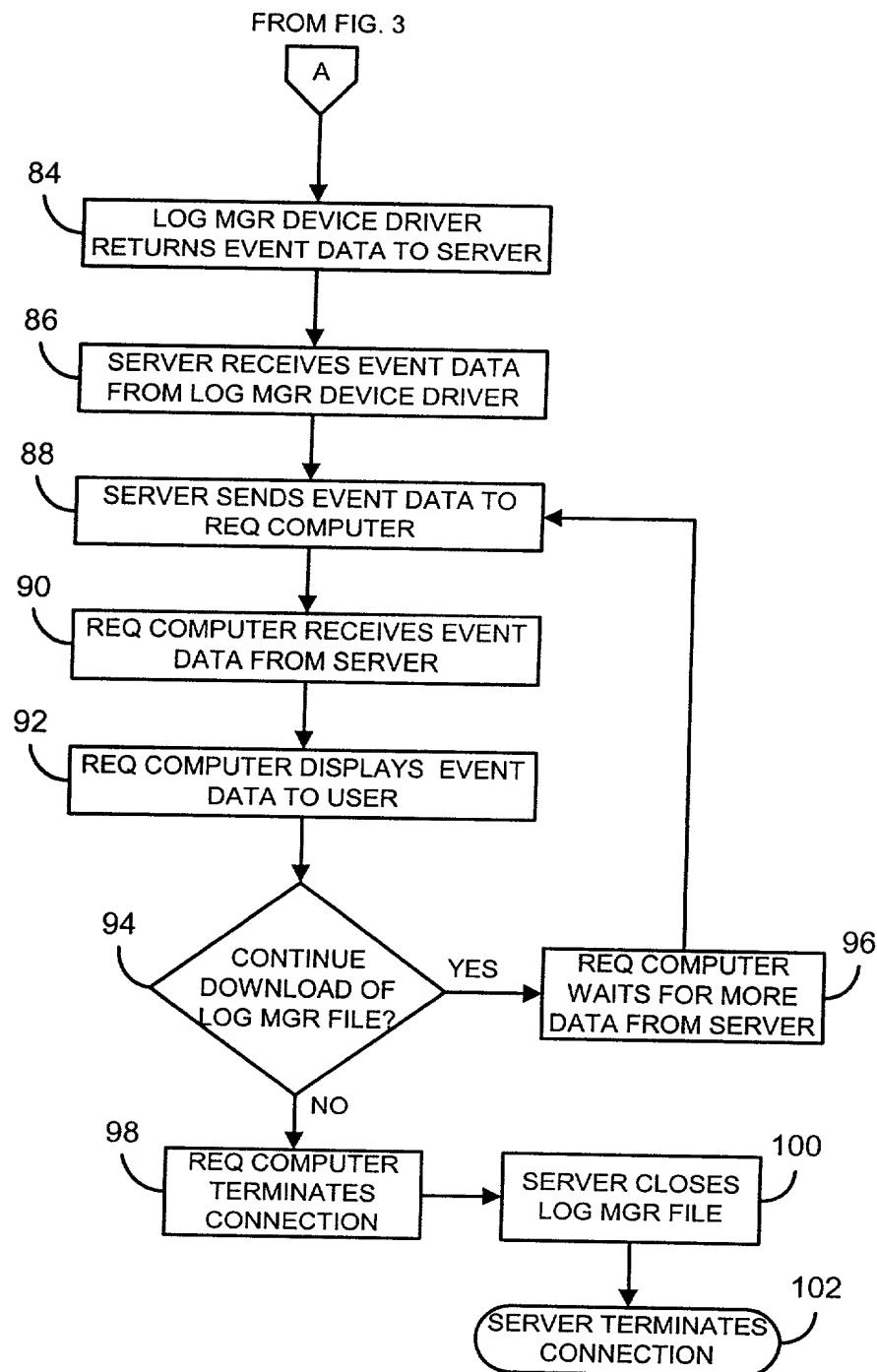


FIG. 4



**DECLARATION AND POWER OF ATTORNEY
FOR PATENT APPLICATION**
ATTORNEY DOCKET NO. 10004339-1

As a below named inventor, I hereby declare that:

My residence/post office address and citizenship are as stated below next to my name;

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

METHOD AND SYSTEM FOR LOGGING EVENT DATA

the specification of which is attached hereto unless the following box is checked:

() was filed on _____ as US Application Serial No. or PCT International Application Number _____ and was amended on _____ (if applicable).

I hereby state that I have reviewed and understood the contents of the above-identified specification, including the claims, as amended by any amendment(s) referred to above. I acknowledge the duty to disclose all information which is material to patentability as defined in 37 CFR 1.56.

Foreign Application(s) and/or Claim of Foreign Priority

I hereby claim foreign priority benefits under Title 35, United States Code Section 119 of any foreign application(s) for patent or inventor(s) certificate listed below and have also identified below any foreign application for patent or inventor(s) certificate having a filing date before that of the application on which priority is claimed:

COUNTRY	APPLICATION NUMBER	DATE FILED	PRIORITY CLAIMED UNDER 35 U.S.C. 119
			YES: _____ NO: _____
			YES: _____ NO: _____

Provisional Application

I hereby claim the benefit under Title 35, United States Code Section 119(e) of any United States provisional application(s) listed below:

APPLICATION SERIAL NUMBER	FILING DATE

U. S. Priority Claim

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code Section 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, Section 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

APPLICATION SERIAL NUMBER	FILING DATE	STATUS (patented/pending/abandoned)

POWER OF ATTORNEY:

As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith:

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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9-6-2000

Date

Dwight M. Hickey

(Use Page Two For Additional Inventor(s) Signature(s))

DECLARATION AND POWER OF ATTORNEY
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Full Name of # 3 joint inventor: _____ Citizenship: _____
Residence: _____
Post Office Address: _____
Inventor's Signature _____ Date _____

Full Name of # 4 joint inventor: _____ Citizenship: _____
Residence: _____
Post Office Address: _____
Inventor's Signature _____ Date _____

Full Name of # 5 joint inventor: _____ Citizenship: _____
Residence: _____
Post Office Address: _____
Inventor's Signature _____ Date _____

Full Name of # 6 joint inventor: _____ Citizenship: _____
Residence: _____
Post Office Address: _____
Inventor's Signature _____ Date _____

Full Name of # 7 joint inventor: _____ Citizenship: _____
Residence: _____
Post Office Address: _____
Inventor's Signature _____ Date _____

Full Name of # 8 joint inventor: _____ Citizenship: _____
Residence: _____
Post Office Address: _____
Inventor's Signature _____ Date _____